2ND INTERNATIONAL PEDIATRIC AND NEONATAL NIV MEETING
BARCELONA, SEPTEMBER 2015

PROGRAM AND ABSTRACTS BOOK
ORGANIZED BY
PICU And NICU Departments of HSJD
And PICU Department of Hospital Central de Asturias

ORGANIZING COMMITTEE
Dr. Martí Pons, Dr. Alberto Medina, Dr. Julio Moreno

SCIENTIFIC COMMITTEE
Dr. Juan Mayordomo,
Dr. Christophe Milési, Dr. Julio Moreno

OFFICIAL LANGUAGES
English. Translation will be available to Castilian

SCIENTIFIC SECRETARIAT

SPONSORS
Dear colleagues,
On behalf of the organizing committee, we are delighted to welcome you to the Second International Conference on Pediatric and Neonatal Non-invasive Ventilation in Barcelona, Spain.

This meeting is a complimentary event to the Biennial European Conference on Pediatric and Neonatal Ventilation organized by Dr. Rimensberger in Switzerland.

This Conference, focused on NIV, will be offering the latest advances to young pediatricians, neonatologists, pediatric intensivists, pediatric pulmonologists, and pediatric and neonatal intensive care nurses/respiratory therapists. It is a multidisciplinary forum where everyone will learn from the lectures of well-known experts in this field.

In addition, true to our commitment to education, we will also offer a series of pre-congress workshops that will focus on very practical bedside issues. We are inviting you to participate and to make this Second Conference on Pediatric and Neonatal Non-invasive Ventilation a high standard event and a great success so it could be organized biennially. With best wishes.

Martí Pons, Alberto Medina
Congress Chair

ENDORSED BY
GENERAL INFORMATION

ARRIVAL AT BARCELONA INTERNATIONAL AIRPORT
Barcelona’s main international airport is only 1.5 km (around 20-30 minutes) from the city centre. When arriving at Barcelona Airport, you have several options for reaching the city centre. The airport has 2 terminals (T1 and T2), please note carefully at which terminal you are arriving and from which you are departing.

There are three ways to travel to Hospital Sant Joan de Déu
Public transportation. Travel card, Hola BCN card (unlimited journeys during 2, 3, 4, 5 days) Buy online www.tmb.cat/en/barcelona-travel-card.
• Bus/public transportation: the Aerobus is a shuttle bus service departing from the airport every 5-10 minutes and reaching the city centre - Plaça Catalunya station in 35 minutes [4 stops]. There are 2 lines of Aerobus, A1 and A2, going, respectively, to Terminal 1 and 2. You may buy the ticket on the bus; the fare is €5.90 for a single ticket and €10.20 for a return ticket. Once you reach Catalunya square, you may continue your journey by underground. Take the L3 green line, direction Zona Universitaria, get off at the last station. Then take the blue bus (JustMetro). It has a stop in front of the Hospital.
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• Taxi: Taxis are available in front of the airport arrival buildings in both terminals. A taxi from the Airport to the Hospital/ Abba Garden hotel costs approximately €30 per trip and takes about 15 minutes (except rush hours). Please be advised that in Barcelona, there may be an extra charge for journeys to/from airport, and/or night supplements.

ARRIVAL IN BARCELONA BY TRAIN
In Barcelona, there are two major train stations, and both have access to the underground system to get around the city.
• Barcelona Sants: this the main train station to the west of the city from which trains for national and international destinations also depart. Take the L3 green line, direction Zona Universitaria, get off at the last station. Then take the blue bus (JustMetro).

ACCOMMODATION
The closest one
Abba Garden Hotel
Santa Rosa, 33
08950 Esplugues de Llobregat (Barcelona)
GPS: N 41º 23’ 07’’ E 2º 06’ 07’’
Tlf. +34 93 503 54 54 / Fax +34 93 503 54 55

The cheapest one
Hostal Lami
Laureu Miró, 278
08950 Esplugues de Llobregat, Barcelona
Tlf. +34 934 70 58 70

SOCIAL PROGRAMME
Gala Dinner. September 25th. 20:30 h
NEONATAL AND PEDIATRIC NIV IN CRITICALLY ILL PATIENTS DURING TRANSPORT

Theoretical Background
• Do we need a transport ventilator? What do we need from a transport ventilator for NIV?
• Different Ventilators and their limitations
• BASICS on NIV + NIV Modes
• Setting up the (right) ventilator… Tips and Tricks from the expert…
• Questions and answers…

17:00 h Coffee break

Hands-on session
4 rotating groups (max. 7 people per group) rotating (2 h)
• Preparation for NIV, patient monitoring and ventilation in transport
• Getting familiar with the ventilators… going into details
• Suitable/easy to use NIV Interfaces for transport (neonatal/pediatric)… Selecting the right interface…
• CASE neonatal/pediatric Skills station

Wrap up and formal closing
Oral FEEDBACK (20 min.)

Supported by an unrestricted educational grant by HAMILTON

NIV IN PEDIATRIC ACUTE SETTING

Theoretical Background
• Basic concepts on NIV for pediatric patients
• How to begin NIV in pediatric patients
• How to provide NIV to my patients ([Nursing staff]
• Discussion

17:00 h Coffee break

Hands-on session
• Common pediatric scenarios (pneumonia, status asthmaticus, bronchiolitis)
• Analysis of failure focused on synchrony
• Wrap up and formal closing

Supported by an unrestricted educational grant by AIR LIQUIDE

NIV-NAVA IN ACUTE SETTING

Theoretical Background
• What NAVA mode is
• Main considerations when using NIV-NAVA
• How to set NIV-NAVA
• Experience in Pediatrics. HSJD experience
• Is it feasible in neonates?

17:00 h Coffee break

Hands-on session
• A new monitoring tool?
• Analysis of videos with rabbit model
• Review of clinical cases
• Problems with NIV-NAVA: Clinical Algorithms in Pediatrics

Supported by an unrestricted educational grant by MAQUET
FINAL PROGRAM

September 24th

08:00-08:45 h CHECK-IN AND REGISTRATION

08:45-09:00 h OPENING CEREMONY

09:00-10:30 h CURRENT SITUATION OF NIV IN THE WORLD

- Current situation in Europe
  Dr. J. Mayordomo
- Current situation in North America/Canada
  Dr. R. Khemani
- Current situation in developing countries
  Dr. A. Argent

10:30-11:00 h COFFEE BREAK

11:00-12:30 h DEEP INSIGHT IN NIV

- Driving pressure in NIV, should I take care?
  Dr. F. Suarez-Sipmann
- Can we rely on the ventilator screen?
  Dr. M. Luján
- Measurement of work of breathing in patients on NIV.
  Dr. R. Khemani

12:30-13:30 h NIV IN TRANSPORT

- How do I manage Pediatric patients in transport
  M. Pons-Odena
- How do I manage Neonatal patients in transport
  Dr. C. Milési
- NIV in the helicopter?
  Dr. I. Garrote

13:30-14:30 h LUNCH SYMPOSIUM

14:30-16:00 h CLINICAL CASES

  5 selected controversial clinical cases to discuss among the audience

16:00-16:20 h COFFEE BREAK

16:20-18:00 h ORAL PRESENTATIONS

18:00-19:30 h MEETING THE EXPERT

In informal exchange of knowledge having a beer with the experts:
- Dr. Suarez-Sipmann/Pons NIV NAVA
- Dr. Khemani/Modesto Monitoring NIV patients
- Dr. Medina/Garrote NIV in transport
- Dr. Mayordomo/Rey Helmet Philips: Clinical Station
**FINAL PROGRAM**

**September 25th**

08:00-11:30 h  **NEONATAL HANDS-ON SESSIONS**
08:00-10:00 h  **PEDIATRIC HANDS-ON SESSIONS**
   (select 2 out of 3) max 50 attendees
   - NAVA in Pediatrics
   - Dr. M. Pons, Dr. L. Pérez
   - Asynchrony management
   - Dr. T. Gili, Dr. J. Mayordomo
   - ARDS scenario: do you agree the algorithm?
   - Dr. A. Medina, Dr. V. Modesto

10:00-10:30 h  **COFFEE BREAK**
10:30-12:30 h  **PEDIATRIC HANDS-ON SESSIONS**
   (select 2 out of 3) max 50 attendees
   - NAVA in Pediatrics
   - Asynchrony management
   - ARDS scenario: do you agree the algorithm?

12:30-13:00 h  **NIV RESEARCH: JOIN OUR TEAM**
13:00-14:15 h  **LUNCH SYMPOSIUM**

14:15-15:30 h  **HAS HFNC A ROLE IN CRITICAL CARE?**
   HFNC in the PICU
   Dr. C. Milési PRO, Dr. A. Medina CON
   HFNC in the NICU
   Dr. K. Ives

15:30-16:00 h  **FROM PICU TO HOME WITH NIV**
   Home NIV ventilator in the PICU, are they useful?
   Dr. C. Milési
   How do I prepare my patient to be discharged from the hospital with NIV?
   Dr. M. Pons

16:30-17:00 h  **COFFEE BREAK**
17:00-17:30 h  **FUTURE BENEFITS AND HAZARDS IN PATIENTS TREATED ON NIV**
   Dr. R. Khemani

17:30-17:45 h  **CLOSING REMARKS**
20:30 h  **GALA DINNER**

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**SATELLITE SYMPOSIUM**

**September 24th**

13:30-14:45 h  **LUNCH SYMPOSIUM**
   Organized by Fisher and Paykel
   High flow oxygen therapy
   Dr. Gonzalo Hernández Martínez.
   Hospital Virgen del Consuelo de Toledo.
   Servei de Medicina Intensiva.

**September 25th**

13:00-14:15 h  **LUNCH SYMPOSIUM**
   Organized by ResMed
   Quality of life in ventilated patients.
   From hospital to home
   Dr. Carmen Luna
   Pediatric pulmonologist, Hosp Univ Doce de Octubre, Madrid
   Dr. Rosário Ferreira
   (Pediatra, Hosp Santa Maria, Lisboa)

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This meeting will be available for FREE for the attendees on the Hospital's e-learning platform during the next 6 months thanks to our sponsor.
2ND INTERNATIONAL
PEDIATRIC AND NEONATAL NIV MEETING
BARCELONA, SEPTEMBER 2015

ABSTRACTS

CLINICAL CASES
Dual ventilation mode for adaptation of non-invasive ventilation in a neonate with ondine’s syndrome
Pneumomediastinum and pneumopericardium as a complication of non-invasive ventilation: case report
Merosin-deficient congenital muscular dystrophy child weaned by means of a combination of positive and negative non-invasive ventilation
High-flow nasal cannula oxygen therapy in child with acute hypoxemic respiratory failure
Oxygen saturation is not always reliable to guide NIV use

ORAL PRESENTATIONS
Relevance of continuing education in non-invasive ventilation in an acute pediatric care hospital: three year experience
High-flow nasal cannula oxygen for acute respiratory failure: experience in the pediatric ward of a first level hospital
Non-invasive ventilation in severe hypoxemic respiratory failure: effect of hybrid-style NIV workshop on knowledge gain
Effect of Hybrid-Style NIV Workshop on Knowledge Gain
Efficiency and safety of boussignac CPAP with helmet in interhospital pediatric transport
Descriptive study of noninvasive ventilation in Spanish PICUs
INTRODUCTION
Ondine’s syndrome is a congenital central hypoventilation syndrome (CCHS) characterized by alveolar hypoventilation mainly during sleep. The therapeutic goal is to maintain adequate ventilation. Dual ventilation mode for noninvasive ventilation (NIV) has not been reported in their management. We describe our experience with NIV in a neonate with Ondine’s syndrome.

METHODS
NIV was initiated in a two-weeks-old neonate with CCHS. Bi-level positive airway pressure (BPAP) mode with NICU ventilator and nasal interface (NI) was initiated, but adequate ventilation wasn’t achieved. The use of a home ventilator in BPAP and spontaneous/timed mode with NI and using Ramp was better tolerated, but ventilation was still inadequate. Thus Volume-Targeted Ventilation (VTV) mode was started with improvement of ventilation but poorly tolerated. Hence both ventilation methods were combined. At sleep onset, NIV started with BPAP in Ramp mode and switched to VTV mode in deep sleep.

DISCUSSION
The usual management of a CCHS patient is mechanical ventilation by tracheostomy, in order to avoid it and its associated complications, we stressed the therapy with two modes of ventilation of NIV. Figure 1 represents the evolution of adjustment of the parameters of NIV and its impact on blood gases. Gastric distention was the most common complication.

CONCLUSION
The NIV in a patient with CCHS should be individualized and intensively monitored. Combination of two ventilatory modes may improve success in ventilation and increase the acceptance in pediatric patients, particularly in neonates.
PNEUMOMEDIASTINUM AND PNEUMOPERICARDIUM AS A COMPLICATION OF NON-INVASIVE VENTILATION: CASE REPORT

T. Gili Bigatà¹, L. Renter Valdovinos¹, S. Sanchez Pérez¹, L. Riera²

INTRODUCTION
Air leaks are a possible complication of positive pressure non-invasive ventilation (NIV), although they are not frequently seen. We present a case of an air leak syndrome due to NIV, involving pericardium.

CASE REPORT
A 7 year-old boy who suffered of acute T-type lymphoblastic leukemia was admitted to the PICU due to seizures secondary to arterial hypertension and reversible posterior leukoencephalopathy (PRES) syndrome. Forty-eight hours after admission, he presented cutaneous lesions compatible with thoracic herpes zoster, mucous membranes and respiratory distress with increasing oxygen needs (FiO₂ 0.5) due to atelectasis/ left lower lobe infiltrate. He was placed on NIV (IPAP 16 mmHg/ EPAP 8 mmHg), oronasal interface and sedation with propofol to control agitation. Ten hours after starting NIV, and due to progressive hypoxemia (SF ratio 132), thorax X-ray was repeated, showing a progression of the left lower lobe infiltrate and air leakage compatible with pneumomediastinum and pneumopericardium. Pneumopericardium was not causing hemodynamic instability. Hypoxemia worsened (SF ratio 103), and conventional mechanical ventilation was initiated, with 5 cmH₂O of PEEP and 17cmH₂O of plateau pressure. SF ratio improved quickly, (240 3 hours later). Lung CT scan was performed and confirmed the presence of pneumomediastinum and pneumopericardium and bilateral pulmonary infiltrates with predominant left lower lobe affection suggesting viral infection.

COMMENTS
Air leakage should be considered in the presence of hypoxemia when using NIV. In rare cases, air leak may affect the pericardium.
INTRODUCTION
Merosin-deficient congenital muscular dystrophy (MDC1A) is a neuromuscular condition commonly associated with muscle weakness, hypotonia and limited mobility. Secondary complications such as scoliosis, frequent chest infections and hypoventilation are common in this cohort of patients. We present a clinical case-study of a 2 year old girl diagnosed with MDC1A admitted to paediatric intensive care requiring mechanical ventilation. After failing extubation a trial of negative pressure ventilation was initiated. This case report discusses the process and weaning protocol implemented when using negative pressure ventilation.

OBJECTIVE
To achieve successful extubation in a child with neuromuscular weakness, through a combination of positive pressure and negative pressure ventilation.

MATERIAL AND METHODS
A trial of extubation was commenced, directly onto non-invasive ventilation (NIV). Physiotherapy was completed six hourly with the use of manual insufflation: exsufflation (MI:E) and regular suctioning. After 24 hours, the child began to fatigue, showing evidence of increased work of breathing, poor oxygenation and left lower lobe collapse of CXR, therefore was re-intubated. Following another two weeks of ventilation, a second trial of extubation was conducted, however this time with the use of negative pressure ventilation, along with positive pressure ventilation. The negative pressure ventilation was administered via a Hayek Jacket set on a continuous negative expiratory pressure (CNEP). A weaning protocol was designed to enable successful weaning of both ventilation, and after three weeks, the child was back to their pre-morbid respiratory status, and safely discharged home.

RESULTS
The implementation of negative pressure ventilation, along with positive pressure ventilation, enable successful extubation of a complex neuromuscular patient, to enable safe discharge home.

CONCLUSION
We conclude that negative pressure ventilation should be considered as an alternative adjunct to enable extubation of neuromuscular patients when positive pressure ventilation alone is deemed insufficient.
INTRODUCTION
High-flow nasal cannula oxygen therapy is a relatively new treatment modality that reduces requirement of mechanical ventilation in moderate hypoxemic respiratory failure. In the literature it has been shown that high flow oxygen therapy generates low levels of positive end-expiratory pressure by creating positive pharyngeal and intra thoracic pressure and that it improves the work of breathing.

CASE REPORT
An 18 months old boy, ingested paraffin oil unintentionally and presented with respiratory failure. On admission, he was tachycardic and tachypneic, his temperature was 38.5°C and SpO₂ was 88% in room air, chest auscultation revealed bilateral decreased air inlet and crackles. Laboratory investigations showed a leucocyte count of 27700 mm³/L with 43.3% neutrophils, and CRP was 0.1 mg/L (N). Venous blood gas analysis revealed hypercapnia: pH 7.33, pCO₂ 52 mmHg, pO₂ 50 mmHg, HCO³ 21.5 mmol/L and lactate 2.1 mmol/L. On chest X-ray, bilateral lung infiltration was seen in the lower lobes (Fig. 1). He was diagnosed with chemical pneumonia and respiratory failure.

The oxygen therapy with rebreathing mask increased SpO₂ only to 90% and there was no improvement on work of breathing. The high flow oxygen therapy was applied with flow 8-10 L per min and FiO₂ 70%. The oxygenation, heart rate, respiratory rate before and after high flow oxygen therapy are shown at Table 1. Flow was gradually decreased to 5 L per min and therapy was discontinued at the fourth day of treatment. A chest X-ray taken at fourth day of the therapy showed marked improvement (Fig. 1).

CONCLUSION
High flow oxygen therapy should be safely considered in the management of moderate hypoxemic respiratory failure. The most important approach during high flow oxygen therapy is monitoring the improvement in vital signs and SpO₂/FiO₂ especially at the first hours of treatment.

<table>
<thead>
<tr>
<th>Time</th>
<th>Heart rate (bpm)</th>
<th>Respiratory rate (bpm)</th>
<th>SpO₂ (%)</th>
<th>FiO₂ (%)</th>
<th>Flow rate (Lpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>200</td>
<td>68</td>
<td>88</td>
<td></td>
<td>Rebreathing mask 10</td>
</tr>
<tr>
<td>30 minutes</td>
<td>180</td>
<td>64</td>
<td>90</td>
<td></td>
<td>Rebreathing mask 10</td>
</tr>
<tr>
<td>First hour</td>
<td>152</td>
<td>52</td>
<td>98</td>
<td>70</td>
<td>8</td>
</tr>
<tr>
<td>Second hour</td>
<td>136</td>
<td>44</td>
<td>99</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>Third hour</td>
<td>116</td>
<td>36</td>
<td>99</td>
<td>60</td>
<td>8</td>
</tr>
</tbody>
</table>

TABLE 1. Respiratory rate, heart rate, SpO₂/inspired oxygen fraction (FiO₂) ratio parameters and treatment response of the patient.
INTRODUCTION
Non-invasive ventilation (NIV) is the first line therapy for acute respiratory failure in most Paediatric intensive care units (PICU). Oxygen monitoring, especially in children with hypoxemic respiratory failure, is of utmost importance to evaluate the effectiveness of NIV. Oxygen saturation/ fraction of inspired oxygen (SF) ratio has been suggested to be a good marker of NIV outcome.

OBJECTIVE
To show a case where the SF ratio was not useful in guiding NIV evolution.

CASE REPORT
15 year-old child was admitted to PICU with the diagnosis of Burkitt lymphoma and tumoral lysis syndrome. He received rasburicase and also NIV because of increased work of breathing and high oxygen requirements. Two hours from the beginning of NIV, SaO₂ was 90% while FiO₂ was 50% (SF ratio 180). A thorax X-ray showed bilateral infiltrates, and ARDS could not be ruled out. Arterial blood gas analysis showed PaO₂ 198 (PF ratio 396). Thus, tracheal intubation was not performed and NIV was continued. The child improved and was discharged 72 hours later. Retrospective review of the blood gases showed an increase of metahemoglobin from 0.9% before the use of rasburicase to 3.3%, which could partly explain this ‘saturation gap’.

COMMENTS
Although SF ratio seems to be useful to monitor children receiving NIV, there are some situations when arterial blood gas analysis are required, mainly if tracheal intubation is being considered.
INTRODUCTION
Regarding new findings in investigation and technology, non-invasive Ventilation (NIV) in pediatrics has become a valuable alternative in cases of acute respiratory failure.

OBJECTIVE
To describe the clinical characteristics, incidence and outcome of patients requiring NIV, to analyze the application of different methods after several years of implementation and to address the impact of continuous based learning supported by clinical experience in the workplace.

EQUIPMENT AND METHODS
Patients with NIV criteria were admitted in the Intensive Care Unit (ICU) pediatric hospital “Sanatorio de Niños”, Rosario, Argentina, from November 2011 to May 2015, prospectively studied by age, gender, time of placement, reason for admission, type and reason of success or failure of the treatment.

A continuous base learning protocol was implemented and supported by scientific meetings and talks. The results are shown as average (DS) or in proportions. To make comparisons within patient groups we used “t” for student, square chi and multivariate analysis. We considered significant a p value < 0.05.

RESULTS
54 patients were recruited, with the following baseline characteristics: mean age in years 6.58 DS 5.75; age in months 5.20 DS 1.69, PRISM 6.99 DS 4.27. In 46.15% cases intubation was prevented in 2011, while it was improved up to 68.42% in 2015 (p=0.27). Oronasal mask was used in 55% of cases. Respiratory failure was the main reason for using NIV 45.3%. Baseline SF ratio was 109.10 DS 17.14 and one hour later it was 154.71 DS 54.33.

CONCLUSION
We can recognize the evolution and epidemiologic outline of pediatric patients that require NIV. We can observe that continuous based learning of kinesiologists, pediatricians and nurses together with a permanent trained and experienced Kinesiotherapy service in the ICU improved the application of NIV and the outcomes were shown with higher rates of success with the implementation of this treatment. This work provides us with important data for designing strategies to improve the quality of assistance given to our patients.
OBJECTIVES
to evaluate the efficiency and safety of high flow nasal cannula oxygen therapy (HFNC) in children admitted with acute respiratory failure in a paediatric ward in a first level hospital.

STUDY DESIGN
Prospective observational study of 32 patients aged between 1 month and 14 years with moderate acute respiratory failure treated with HFNC from July 2013 to December 2014. Clinical parameters, heart rate, respiratory rate, oxygen saturation, respiratory distress score, fraction of inspired oxygen, flow, length of stay and admission to PICU were recorded.

RESULTS
The average age of patients was 23 months (range 1 month-13.7 years). The diagnosis were 37.5% bronchiolitis and 62% asthma attack. Respiratory syncytial virus was present in 32%, more or less the same proportion in bronchiolitis and in asthma. Average length of stay was 3 days (range 1-9). Average duration of treatment was 24 hours (range 2-120). HFNC was associated with a significant decrease in respiratory rate, heart rate and with an improvement of the respiratory distress score after 3 hours of therapy (p< 0.01). No adverse effects were observed. 9 patients (28.1%) were transferred to the PICU and their mean stay there was 4.5 days (range 2-7). Our corresponding PICU is at a distance of 80 Km from our unit, all the patients were transferred with non-invasive positive-pressure ventilation, and they didn’t need mechanical ventilation in the PICU. We have seen a reduction of 5% in PICU admissions since we started using high flow therapy: 17% before and 12% after using high flow therapy.

CONCLUSIONS
HFNC treatment is safe in the paediatric ward and it improves respiratory rate, heart rate and respiratory distress score in patients with moderate acute respiratory failure. Since we started using HFNC in our unit we have seen a significant reduction in PICU admissions, which we consider positive from both an economical and clinical point of view.
NON-INVASIVE VENTILATION IN SEVERE HYPOXEMIC RESPIRATORY FAILURE

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¹Koç University School of Medicine; Pediatric Intensive Care Unit. ²Bezmialem University School of Medicine, Department of Pediatrics, Istanbul, Turkey.

INTRODUCTION
Early ventilation support is the cornerstone management of acute hypoxemic respiratory failure. However treating severe acute hypoxemic respiratory failure with non-invasive ventilation and choosing the best ventilation strategy is a challenging topic. In this paper we present our experience with patients who had severe hypoxemic respiratory failure and were ventilated non-invasively.

PATIENTS
During study period we had four patients who had severe acute hypoxemic respiratory failure. The patients were treated with non-invasive ventilation and decremental PEEP strategy was applied. The patients’ age and diagnosis were 6-years-old girl with gunshot injury, 7-years-old boy with ALL and ARDS, 13-years-old girl patient with pneumonia and 10-years-old boy with TRALI. Patients median heart rate decreased by 20% and 43%, median respiratory rate decreased by 32% and 57% after 2 and 24 hours of non-invasive ventilation, respectively. Median S/F ratios increased by 69% and 147% after 6 and 24 hours of non-invasive ventilation, respectively. The authors started non-invasive ventilation with 13 mmHg of median EPAP and 17 mmHg median IPAP. Median EPAP was 11 mmHg and median IPAP was 14 mmHg at 24 hours of non-invasive ventilation.

CONCLUSIONS
The authors’ clinical experience in few cases suggests that decremental PEEP may have positive effect on clinical course of severe hypoxemic respiratory failure.
EFFECT OF HYBRID-STYLE NIV WORKSHOP ON KNOWLEDGE GAIN

M.H. Temsah¹,2, A. Al-Eyadhy¹,2, S.M. Iqbal¹,3, M. Ab. Alkhateeb²
¹Assistant Professor of Pediatrics, King Saud University, Riyadh, Saudi Arabia; ²Pediatric Intensive Care Unit, King Khalid University Hospital, Riyadh, Saudi Arabia; ³Consultant in Pediatric Pulmonary and Sleep Medicine, King Khalid University Hospital, Riyadh, Saudi Arabia.

INTRODUCTION
Dedicated Non-Invasive Ventilation (NIV) training provision to Multidisciplinary Healthcare-Workers (HCWs) is likely to improve service delivery. Some limiting factors for such training is limited time in the busy schedules and variable learning objectives.

OBJECTIVES
Based on previous Simulation-Courses experience, a Hybrid Workshop was designed for "Mastering the Art of Pediatric-NIV", to better serve Multidisciplinary HCWs. We aimed to measure improvement on knowledge-domain in a one-day workshop.

MATERIAL AND METHODS
The Hybrid-Style consisted of Pre-Workshop learning material, specific for each discipline, accompanied by Group-discussions online and via social media (WhatsApp©) by Candidates and Workshop Faculty. The workshop consisted of lectures, interactive case-scenarios and Hands-on Skills practice.

RESULTS
20 Candidates attended the first Workshop (13 participating in the Hybrid Group (HG), 7 in Conventional Group (CG) who had no special preparation). Comparing Pre-Post Test scores, the two groups differed significantly in terms of knowledge gained. When Post knowledge was compared between the groups independently, HG had higher median score (Mdn.=65%) than conventional (Mdn.=62%) and Mann-Whitney U test for independent groups showed borderline significant difference (P=0.08). Moreover, Pretest scores did not differ significantly. Furthermore, Wilcoxon signed test for dependent groups was conducted on each group separately, and showed that for HG; the median knowledge score Post-NIV session (Mdn.=73%) were higher than that in the Pre-NIV session (Mdn.=62%), with statistically significant difference (P < 0.01, Effect Size (r)=0.85). However, the same test conducted on CG revealed that the difference between pre-post knowledge scores was not significant (P=0.29, Effect Size (r)= 0.4).

CONCLUSION
In this Hybrid NIV Workshop, there was considerable improvement in knowledge-domain, however, this needs to be confirmed with bigger sample size in the future. Our next step is to assess changes in other domains, particularly skills-domain, through a pre-designed Hybrid module.
EFFICIENCY AND SAFETY OF BOUSSIGNAC CPAP WITH HELMET IN INTERHOSPITAL PAEDIATRIC TRANSPORT

M. Bartolomé Cano1, C. Molinos Norniella2, P. del Villar Guerra3, V. García González2, R. Manso Ruiz de la Cuesta1, E. Fernández Fernández2
1Department of Pediatrics. Santos Reyes Hospital. Aranda de Duero. Castilla y León. 2Department of Pediatric. Cabueñes Hospital. Gijón. 3Department of Paediatric. Segovia Hospital Complex. Castilla y León. Spain.

OBJECTIVES
To evaluate the efficiency and safety of Boussignac CPAP with helmet in children under 1 year transferred from two first level hospitals to their corresponding PICU.

STUDY DESIGN
Retrospective observational study of 40 patients with moderate or severe acute respiratory failure treated with non invasive ventilation during transport in Santos Reyes Hospital and Cabueñes Hospital. The distance to our corresponding PICU is 80 and 28 km respectively; all the transfers were made by ambulance. Vital signs, blood gas analysis, respiratory distress score, fraction of inspired oxygen, pressure, diagnosis, interventions, complications and escalation of respiratory support after admission to PICU were recorded. The variables were analyzed before CPAP support and one hour after.

RESULTS
The average age was 4 months (range 0.8-11.5 months). The diagnosis were 77.5% bronchiolitis, 12% asthma attack, 5% pneumonia and 5% respiratory infection. Ten suffered apnoea episodes. The mean pressure was 6.9 cmH2O (range 5-8). The respiratory support was associated in 32 patients (80%) with 15% of decrease in respiratory rate after one hour. We observed a decrease in heart rate of 6%. 37 patients had a significant improvement on the Wood Downes modified score with an average reduction of 2.67 points (p = 0.004).

No adverse effects were observed. No patients were intubated during transport. Fifteen patients (37.5%) were escalated to BiPAP, 9 during the first six hours of admission in PICU, and the other six patients afterwards. 7.5% required intubation and mechanical ventilation. All patients needed respiratory support during the first day in the PICU.

CONCLUSIONS
Boussignac CPAP with helmet interface improves respiratory rate, heart rate and respiratory distress score in infants with acute respiratory failure and it is a safe system for transferring infants.
INTRODUCTION AND OBJECTIVES
To study the characteristics and results of non-invasive ventilation (NIV) in Spanish Pediatric Intensive Care Units (PICUs).

METHODS
An observational, prospective, multicenter study was carried out. Patients who required NIV during hospitalization in 12 PICUs between December 2012 and February 2015 were included. Demographic, clinical and NIV related data were collected.

RESULTS
886 patients (57% male) between 36 ± 4 months of age were studied. 53% had an underlying disease, congenital heart disease (17%). The most frequent reason for admission to the PICU was bronchiolitis (33%). The main indication for NIV was hypercapnia (62%). In 29% of patients NIV was used post-extubation, 58% of them, was elective. S/T mode was the most common initial support (48%). The most common interfaces at the beginning of NIV were nasopharyngeal tubes (26%) and Total facemasks (24%). NIV failed in 19% of patients. 11.5% of patients had complications, being erythema (6%) and pressure sores (2%) the most frequent. 8% of children died, apparently of causes not related to NIV.

CONCLUSION
NIV is widely used in the Spanish PICUs with a lower rate of failure than previous published studies.